REMARKS

Claims 12, 14 and 15 have been amended. Claims 12-18 are currently pending in this application. Applicants reserve the right to pursue the original and other claims in this and other applications. Applicants respectfully request reconsideration in light of the above amendments and the following remarks.

The previously filed amendment filed January 15, 2010 is objected to as introducing new matter. Reconsideration is respectfully requested. The subject matter indicated by the Office Action as being new matter has been canceled herein. Accordingly, Applicants respectfully request the objection be withdrawn.

Claims 12, 14 and 15 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. Claims 12, 14 and 15 have been amended to delete the subject matter indicated by the Office Action as lacking enablement and to clarify the claims in light of the disclosure of Specification. Accordingly, Applicants respectfully submit that the rejection be withdrawn and the claims allowed.

Claims 12-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dudley et al. (U.S. Patent No. 6,627,887) ("Dudley") in view of Archie (U.S. Patent No. 6,472,662) ("Archie"). This rejection is respectfully traversed and reconsideration in respectfully requested.

Independent claims 12 and 14 each recite a "method of determining a concavity or a convexity of line and space patterns of a sample, the line and space patterns being arranged alternately on the sample," including the steps of "scanning the line and space patterns on the sample with a charged particle beam," "forming, based on detected charged particles emitted from each of the scanned portions of the sample, a profile waveform of an intensity of the charged particles" and "forming a derivative waveform of said profile waveform."

The method of claim 12 further includes the steps of "comparing, referring to first and second peaks, which are adjacent positive and negative peaks of said derivative waveform that are

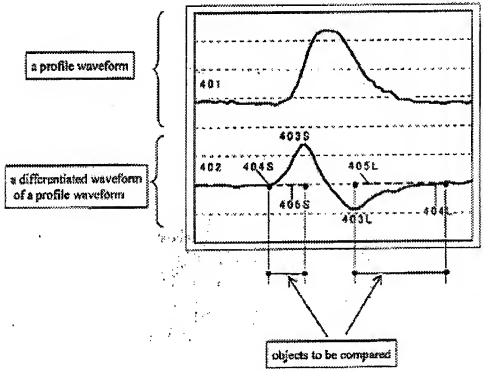
generated at positions corresponding to opposite sides of a single peak of said profile waveform, a first distance between a first zero-point of the derivative waveform and a corresponding peak position of said first peak with a second distance between a peak position of said second peak and a corresponding second zero-point" and "determining, based on the comparison of the first and second distances and referring to said first and second peaks of said derivative waveform, regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform to be the space pattern and the line pattern, respectively, when said second distance is longer than said first distance, and determining regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform to be the line pattern and the space pattern, respectively, when said first distance is longer than said second distance."

The method of claim 14 further includes the steps of "obtaining, referring to first and second peaks which are adjacent positive and negative peaks of said derivative waveform that are generated at positions corresponding to opposite sides of a single peak of said profile waveform, an evaluation value from each of said first and second peaks," "comparing the evaluation value obtained from said first peak with the evaluation value obtained from said second peak" and "determining, based on the comparison of the evaluation values and referring to said first and second peaks of said derivative waveform corresponding, regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform to be the space pattern and the line pattern, respectively, when said evaluation value obtained from said second peak is larger than said evaluation value obtained from said first peak, and determining regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform to be the line pattern and the space pattern, respectively, when said evaluation value obtained from said first peak is larger than said evaluation value obtained from said second peak."

According to the disclosed embodiments, the properties of the derivative waveform profile can be used to determine the line and space pattern of the sample to which the derivative waveform profile corresponds. See, e.g., Specification, pg. 7, lines 14-20. The distance between corresponding points where the peak (of the derivative waveform) becomes zero ("zero-point") and

peak positions of each of first and second peaks (e.g., positive and negative peaks of the derivative waveform of a profile waveform) are compared in order to make this determination. See, e.g., Specification, pg. 8, lines 2-25. A set of positive and negative peaks is generated corresponding to each single peak of the profile waveform, one of each of which in turn corresponds to each boundary between lines and spaces. See, Specification, pg. 6, line 29 – pg. 7, line 4.

The annotated version of FIG 4 shown below illustrates an example segment of a profile waveform (e.g., such as that in FIG. 3C), corresponding segment of a derivative waveform and the objects to be compared (e.g., the "first distance" and "second distance" or "evaluation values").



In other words, a comparison is made between the first distance/evaluation value 405S acquired from the positive peak and the second distance/evaluation value 405L acquired from the negative peak. See, Specification, page 6, lines 6-28. Corresponding zero-points and peak positions, in the Example of Fig. 4, are 404S & 403S and 404L & 403L, respectively. See, Specification, pg. 8, lines 13-25. By comparing the first and second distances/evaluation values of the first and second peaks,

a determination can be made as to whether the correspondingly adjacent regions of the sample are the line pattern or the space pattern. See, e.g., Specification, pg. 7, lines 14-20.

The method disclosed in Dudley, on the other hand, is for determining dimensions of a profile of a structure in an integrated circuit (col. 1, lines 53-55) and for determining whether these dimensions or cross section of the profile meet acceptable standards (col. 4, line 26). However, these measurement objects are known in advance to be convex structures; the method of Dudley is not able to distinguish between a concave portion and a convex portion in a pattern. As noted above, however, it is an object of the claimed invention to accurately distinguish between the line and space patterns on a sample, e.g., to determine which portions of the sample are a line pattern and which are a space pattern.

As clarified by the amendments to the claims, the claimed "first distance" corresponds to the "distance [e.g., 405S] between a first zero-point [e.g., 404S] of the derivative waveform and a corresponding peak position [e.g., 403S] of said first peak" of a set of "first and second peaks, which are adjacent positive and negative peaks of said derivative waveform that are generated at positions corresponding to opposite sides of a single peak of said profile waveform." In contrast, LEW2-LEW4 of Dudley correspond to "the distance between the outer edge of the left peak 146 and the left boundary 129a of the center distance C at each baseline BL0-5." Dudley, col. 3, lines 31-34. In other words, LEW2-LEW4 correspond to the distance between a portion, which is not the peak top, of the left peak 146 and the peak top of an adjacent negative peak 151 which is not the peak 146 but defines the "left boundary 129a of the center distance at each baseline BL0-5." Id.

Likewise, the claimed "second distance" corresponds to the "distance [e.g., 405L] between a peak position [e.g., 403L] of said second peak and a corresponding second zero-point [e.g., 404L]" of the set of "first and second peaks, which are adjacent positive and negative peaks of said derivative waveform," from which the "first distance" is also obtained. In contrast, LEW5 of Dudley corresponds to the distance between the peak top of the left peak 146 and the peak top of the

adjacent negative peak 151 which is not the peak 146 but defines the "left boundary 129a of the center distance C." Id.

As described above, each of the first (longer) distances and the second (shorter) distances in Dudley, relied on by the Office Action, is not obtained from a single positive peak or negative peak (as claimed) of the derivative waveform, but is instead obtained from a plurality of positive or negative peaks 146/151. See also, Dudley, Fig. 3A. Accordingly, Dudley does not disclose, or render obvious, determining and comparing the first and second distances (or evaluation values), as claimed.

Further still, Dudley does not disclose, or render obvious, "determining ... regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform to be the space pattern and the line pattern, respectively, when said second distance is longer than said first distance, and determining regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform to be the line pattern and the space pattern, respectively, when said first distance is longer than said second distance," as claimed. Instead, Dudley merely discloses determining positions of the left side and right side and measurements of a known convex pattern.

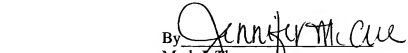
Archie is relied upon as disclosing "scanning line and space patterns" (Office Action, pg. 9) and does not remedy the deficiencies of Dudley as to claims 12 and 14.

Accordingly, Applicants respectfully submit that claims 12 and 14 are allowable over the cited combination. Claims 13 and 17 depend from claim 12 and are allowable along with claim 12. Claims 15, 16 and 18 depend from claim 14 and are allowable along with claim 14. Applicants respectfully request the rejection be withdrawn and the claims allowed.

In view of the above, Applicants believe the pending application is in condition for allowance.

Dated: August 17, 2010

Respectfully submitted,

By 
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